PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited in the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on April 4, 2003.

Benjamin L. Volk, Jr.
Reg. No. 48,017

In re application of: Indeck et al.	:	
Serial No.: 09/545,472	:	Examiner: Fleurantin, Jean B.
Filed: April 7, 2000	:	Group Art Unit: 2172
For: Associative Database Scanning And Information Retrieval	:	

Assistant Commissioner for Patents
Washington, D.C. 20231

AMENDMENT AND RESPONSE A

In response to the Office Action dated November 4, 2002, Applicant submits the following amendment and remarks. At the time of the Office Action, claims 1-42 were pending in this application. By this response, Applicant submits new claims 43-81. Thus, the pending claims of the application are now 1-81.

Accompanying this response is a petition for a three-month extension of time along with a payment of the appropriate fee. Further accompanying this response is a supplemental Information Disclosure Statement together with the appropriate fee. It is believed that the designated fees are correct but, in the event these fees are insufficient, please charge the balance to Deposit Account 20-0823.

In the Claims:

1. Please leave claims 1-8 unchanged;

2. Please amend claim 9 as shown in the enclosed marked-up copy of amended claim 9;

3. Please leave claims 10-33 unchanged;

4. Please amend claim 34 as shown in the enclosed marked-up copy of amended claim 34;

5. Please leave claims 35-42 unchanged; and

6. Please add new claims 43 through 81 as shown in the enclosed clean copy of the new claims.

In the Drawings:

1. Please replace Figure 1 with the enclosed clean copy of replacement Figure 1. Also enclosed herewith is a marked-up copy of replacement Figure 1 that identifies in red the changes being made;

2. Please replace Figure 5A with the enclosed clean copy of replacement Figure 5A. Also enclosed herewith is a marked-up copy of replacement Figure 5A that identifies in red the changes being made; and

3. Please replace Figure 9 with the enclosed clean copy of replacement Figure 9. Also enclosed herewith is a marked-up copy of replacement Figure 9 that identifies in red the changes being made.

Remarks:

Applicant submits that no new matter is added by the inclusion of replacement Figure 1 because the replacement Figure 1 corresponds with the original informal figures. Namely, original Figure 1 showed communication lines between the bus 34 and microprocessor/PLD 22. Further, Applicant submits that no new matter is added by the inclusion of replacement Figure 5A. The correction to box 69 simply corrects a typographical error wherein "orage" should be "storage". The correction to box 70 corrects an error wherein the phrase "store digital sample of analog digital" should be "store digital sample of analog key". The obviousness of this correction is apparent from the application at page 11, lines 24-30, wherein Applicant describes

storing digital samples of an analog key at step 70. Lastly, no new matter is added by the inclusion of replacement Figure 9. Original Figure 9 does not include reference numeral 325 with a lead line pointing to the peak in the signal. However, the obviousness of the inclusion of the reference numeral 325 and corresponding lead line is apparent from the description on page 14, lines 13-15 of the application, wherein, with reference to Figure 9, Applicant notes that "[a]t approximately the point labeled 325, a distinct peak is noted which approximates 1, indicating a very close match between the key and the pseudo-random binary sequence." Therefore, because no new matter is present in the replacement figures, Applicant respectfully requests entry of the replacement figures.

Claim 9 has been amended to eliminate a phrase relating the analog key with the "data itself". No new matter is added by this amendment. Claim 34 has been amended to recite that the matching circuit is a matching circuit that framelessly compares the key with the data stream. Support for this amendment can be found throughout the application, particularly on page 3, lines 13-15. Further, Applicant submits that no new matter is included by the addition of new claims 43-81. New claims 43-81 are patentable over the cited references for the same reasons set forth below.

I. Shortcomings of the cited references.

(a) U.S. Patent No. 4,464,718 (the Dixon patent) fails to disclose, teach, or suggest a processor that performs approximate matching and further fails to disclose a pattern matching or pattern comparison operation that is performed between a key and a continuous stream of data.

(i) Approximate Matching

The Dixon patent discloses an associative file processing method and apparatus. *As noted in the background section of the application among various other shortcomings, the Dixon patent fails to address approximate matching.*

> Dixon's comparisons are limited by a fixed number of standard logical operation types. Additionally, the circuitry presented only supports these single logical operations. *There is no support for approximate or fuzzy matching.* (See Application, page 2, lines 3-11 (emphasis added)).

With the reference to Figure 1 of the Dixon patent, an I/O controller 16 (see Figure 1) receives a data scan request from the CPU 10. This request is formatted as shown in Figure 2. The purposes of the various words specified in the data scan request of Figure 2 are discussed

in Dixon at col. 5, lines 1-52. In particular, word 0 corresponds to "command bits" that indicate whether, when a "hit" is found, an entire data record corresponding to the "hit" or only a portion thereof should be returned. (See Dixon, col. 5, lines 4-8). Further, word 7 specifies "the address in the main memory where the search argument is to be found". (See Dixon, col. 5, lines 45-47). The search argument is used by the record scan circuit 20 as a point of comparison with data that is read from files 0-3 (identified by reference numerals 24A through 24D).

When discussing the type of matching operations that are performed by the record scan circuit 20, Dixon identifies only a fixed number of exact match operators. Dixon defines a "hit" as a match found between the search argument and the data records for any of the following operators: $=, \neq, \geq, \leq, >$ and $<$. (See Dixon, col. 6, line 63 – col. 7, line 1; col. 8, lines 1-5). As used by Dixon, these operators are exact match operators, and are not used for approximate matching. The answer provided by the Dixon system to the search question is an "exact" one. That is, the answer to the question "is the value of Data Record A less than Search Argument 1?" has a yes/no answer *with a certainty of 100%*. Similarly, the answer to the question, "is the value of Data Record B greater than or not equal to Search Argument 2?" has a 100% certain yes/no answer. Accordingly, Applicant respectfully submits that the Dixon patent fails to disclose, teach, or suggest approximate matching, and *instead teaches the use of conventional exact matching*.

Applicant distinguishes the approximate matching techniques of the present invention from exact matching techniques in the application from page 7, line 32 through page 8, line 27, reproduced below:

> When performing an exact match in the analog domain, at Point A in Figure 1A, where matching is done using analog comparators and correlation techniques, there *an exact match corresponds to setting a sufficiently high threshold value for matching the key with analog source data in the storage medium*. Approximate matching in this analog domain corresponds to setting appropriate (lesser) threshold values. *When performing an exact match in the digital domain, an exact match is performed using digital comparators and logic as suggested in current art, where a digital key is compared with digital source data from the storage medium*. Such matching could be performed at Point B or Point C, as shown in Figure 1A, which corresponds to the pre- and post-error-corrected digital signal, respectively. Approximate matching in this domain corresponds to performing comparisons or digital correlation of the digital key with digital source data obtained from the storage medium. The digital key may contain "wild card" or "don't care" digital bits or data formats. The success of

> an approximate match may be determined by setting a correlation value or by using one of a number of matching-performance metrics such as the number of bits within a key that are equal to the corresponding bits in the scanned source data. Also, note that the data entries identified in an "approximate" match search will include the "exact" hits that would result from an "exact" search. For clarity, when the word "match" is used, the reader should understand that it includes a search or a data result found through either of an approximate search or an exact search. *When the phrase "approximate match" or even just "approximate" is used, the reader should understand that it could be either of the two searches described above as approximate searches, or for that matter any other kind of "fuzzy" search that has a big enough net to gather data entries that are closely related to the search criteria. Of course, an exact match is just that, and does not include any result other than an exact match of the search criteria with a high degree of correlation*. (See Application, page 7, line 32 – page 8, line 27 (emphasis added)).

As noted in the above-quoted passage from the application, Applicant describes approximate matching and contrasts this approximate matching with exact matching of the type taught by Dixon. Particularly, Applicant describes conventional digital exact matching as disclosed by Dixon as a match that "does not include any result other than an exact match of the search criteria with a high degree of correlation". (See Application, page 8, lines 24-27).

On the other hand, approximate matching is a "fuzzy" search that "has a big enough net to gather data entries that are loosely related to the search criteria." (See Application, page 8, lines 23-24). In an example for approximate matching in the digital domain, the application notes that "approximate matching ... corresponds to performing comparisons or digital correlation of the digital key with digital source data obtained from the storage medium. The digital key may contain "wild card" or "don't care" digital bits or data formats. The success of an approximate match may be determined by setting a correlation value or by using one of a number of matching-performance metrics such as the number of bits within a key that are equal to the corresponding bits in the scanned source data." (See Application, page 8, lines 7-14).

Thus, the approximate matching of the present invention stands in stark contrast to the exact matching disclosed by Dixon because approximate matching provides retrieval abilities that are not easily available to exact matching, such as (1) the ability to "find data that has been corrupted, incorrectly entered data, data which only generally corresponds to a category, as well as other kinds of data searches that are highly desired in many applications"

(see Application, page 4, lines 3-9), and (2) the elimination of the need for a searcher to devise "a combinatorial number of specialized searches" (see Application, page 4, lines 14-22).

The Office Action appears to equate Dixon's disclosure that, upon finding a "hit", "either the entire data record or a specified part thereof" can be returned by the scan circuit with the approximate matching of the present invention. (See Office Action, pages 2-3). However, Applicant respectfully disagrees because this disclosure relates not to approximate matching (wherein a data record that only approximately matches a search key can be identified as a "hit"), *but instead to how the Dixon system responds to an exact match*.

For example, in a database having a plurality of data records, each data record comprising a name, an address, and a telephone number, a person may wish to search the database for the phone number "555-555-5555". Upon finding a record with an exact match of the search argument "555-555-5555", the Dixon system has the ability to return either the entire data record within which the exact match was found (i.e., name, address, and telephone number) or only a portion of the data record within which the exact match was found (i.e., only the name for the matching phone number, etc.). Applicant respectfully submits that the system described by Dixon constitutes an exact matching system despite the ability to return an entire matching record or only a fragment thereof because, regardless of what occurs after a "hit" is found, the "hit" is always representative of a positive answer with a certainty of 100% to the question "Is Search Argument A present in Data Record 1?" Simply put, the above-described technique for returning either a whole record or partial record relates only to activities that occur after an *exact match* has been found.

Therefore, it Applicant's position that, in addition to various other shortcomings, many of which are described by Applicant on page 2, lines 3-11 of the application, the Dixon patent fails to disclose, teach, or suggest the use of approximate matching.

(ii) ***Pattern Matching or Pattern Comparison***

Moreover, the Dixon patent fails to disclose, teach, or suggest performing a *pattern matching* or *pattern comparison* operation between a key and a continuous stream of data. The application notes that a pattern matching/pattern comparison operations are a preferred feature of the present invention.

> [I]t should be understood that this is a *continuous* process and that data is processed from the mass storage medium 26 *as a stream* and *not in*

individualized chunks, frames, bytes, or other predetermined portions of data. While this is not precluded, the present invention preferably allows a *key to be in essence "slid" over a continuously varying data read signal* such that there is no hesitation in reading from the mass storage medium 26. There is no requirement to synchronize reading to the start or end of any multi-bit data structure, or any other intermediate steps required to be performed as the data is compared continuously "on the fly" as it is read from the mass storage medium 26. This type of comparison and correlation may be referred to as a *pattern match or comparison*. (see Application, page 12, line 39 – page 13, line 12 (emphasis added)).

In stark contrast with various claim limitations of the present application relating to pattern matching or pattern comparison, the Dixon patent discloses a matching process that does operate on "individualized chunks" or "bytes" of data. Dixon teaches a matching operation that he calls a "compare-and-skip operation". This "compare-and-skip operation" is characterized in that:

> for each data record received from the files, a comparison operation is performed. This [is] done by skipping an initial length of data in each record corresponding in length to the skip length. After this, the search argument is compared with a key field of the data having the same length as the key length and search argument. *Following the initial comparison operation, a subsequent length of data is skipped in a length specified by the data length. A segment of the record corresponding to the key length is then again compared with the specified search argument, after which again a length of data specified by the data length is skipped*. The *compare-and-skip operation* is continued until the end of the record or until a specified number of comparison[s] have taken place. (see Dixon, col. 3, lines 23-38 (emphasis added)).

With the Dixon system, a data scan request having the format shown in Figure 2 includes a word that identifies both (1) a data length (DL) that specifies a number of bytes within a data record to be skipped during the key matching operation, and (2) a key length (KL) that specifies the number of bytes within a data record to be compared with the search key. (see Dixon, col. 5, lines 39-45; Figure 2).

Figures 3A and 3B illustrate how this compare-and-skip operation proceeds according to the data length and key length identifiers in the scan request. In particular, Figure 3A depicts how the compare-and-skip operation jumps from data record to data record (a comparison between a data record and a key is only performed when an relative block address (RBA) match 53 occurs). Figure 3B depicts how the match operation is performed within the RBA-matching data record. The record scan circuit first skips a number of bytes at the start of the data record

that is equal to the value of the skip length identifier (SL) in the data scan request (see word 1 of Figure 2). Next a comparison is made between the search key and a number of bytes in the data record specified by KL. Thereafter, a number of bytes equal to DL is skipped, and the process repeats itself until the end of the data record is reached. (see Dixon, col. 5, line 53 – col. 6, line 40; Figures 3A and 3B).

By disclosing and teaching a compare-and-skip exact matching operation, *the Dixon patent fails to teach pattern matching* (wherein the key is continuously slid over streaming data) as claimed by Applicant. Further, Applicant notes that the statement found in Dixon that "[t]he search argument is then read out byte-by-byte from this memory and compared serially bit-by-bit with the serial stream of data received from the files" (see Dixon, col. 3, lines 49-52) fails to disclose, teach, or suggest the present invention's use of a pattern matching/pattern comparison operation between a key and a continuous stream of data because this statement merely refers to how the comparison portion of the "compare-and-skip operation" is performed. That is, after the Dixon system has skipped to the individualized chunk of data that will be compared with the search key, each bit of that data chunk is read out in series and compared with the search key to determine whether a "hit" exists. Therefore, Applicant respectfully submits that such an operation does not constitute performing a pattern match/comparison operation between a key and a continuous data stream because, with Dixon, the stored data that is to be searched is processed by exact matching a key *only to individualized chunks of that data* rather than processed by *pattern matching* a key to a continuous stream of that data. Applicant specifically excludes the chunk-by-chunk match comparisons disclosed by Dixon from the scope of "pattern matching" or "pattern comparison" operations claimed herein. (See Application, page 12, line 39 – page 13, line 12).

(iii) The Dixon patent further fails to disclose, teach, or suggest frameless matching between a key and a continuous data stream.

Moreover, the Dixon patent fails to disclose, teach, or suggest performing frameless matching between a key and a continuous data stream. Applicant notes that a preferred feature of the present invention is its ability to match the key to data independently of the structure or format with which the data is stored.

> [T]here is *no* requirement that the data be "*framed*" or compared utilizing the structure of format in which the data has been organized and stored. (See Application, page 3, lines 13-15 (emphasis added)).

The Dixon patent, on the other hand, requires that the exact match operation occur within the confines of the format in which data is stored. As shown in Figures 3A and 3B, the "compare-and-skip" exact matching operation of the Dixon system requires that each data record be accessed via its address, and further requires that each data record be compared with the search key for an exact match determination in 256 byte units subdivided into chunks (some of which are skipped (DL) and some of which are compared to the search key (KL)). Because the Dixon patent teaches the use of chunk-by-chunk exact matching within discrete data records of a specified byte length, Applicant respectfully submits that the Dixon patent fails to disclose, teach, or suggest frameless matching between a key and a continuous data stream.

(b) U.S. Patent No. 5,140,692 (the Morita patent) suffers from the same shortcomings discussed above with the Dixon patent and further fails to disclose, teach, or suggest the use of an analog key when scanning a stream of data for matches to the key.

(i) Analog Key Matching

The Office Action cites Morita for the proposition that "Morita teaches the steps of designating a retrieval condition including one or a plurality of designated keywords, said retrieval condition determining a registered document which is to be retrieved from said storage means based upon an analog signal comparison; *which is readable as determined key being an analog signal representative of the data itself* and the data signal also being an analog signal (see col. 5, lines 9-15)." (See Office Action, page 6; emphasis added). However, Applicant disagrees with this statement for the reasons stated below. Applicant particularly disagrees with the statement that the keywords used by the Morita system are "readable as" the keys of the present invention. Applicant respectfully submits that the Morita reference fails to disclose, teach, or suggest a matching operation based on a comparison of an *analog key with a continuous stream of data*.

Instead, the Morita patent teaches that documents stored in a database should be represented during the "search" process by keywords. These keywords are associated with each other (termed "keyword relationships" by Morita) and are also associated with documents stored in the database. Each keyword relationship $W_{p,q}$ has a numerical value indicating the nature of the relationship between keyword p and keyword q (wherein a high value for $W_{p,q}$

indicates a close relationship between keywords p and q). For a given search query that includes one or more keywords, the Morita system will produce a series of keyword relationship values applicable to a given document i. These keyword relationship values are converted to analog values and are then summed (using analog components) to determine the "relevance" of document i to the search query. (see Morita, col. 2, formula (1)). As such, *the "keywords" are not used as a point of comparison for finding matches with streaming data*, but rather are used as subcomponents in a relevance determination.

Accordingly, the Morita "keywords" and "keyword relationships" do not correspond to the analog key used with the present invention. The only "matching" performed by the Morita system is exact matching that occurs when the system processes an input search query. With Morita, the input search query is parsed to identify one or more search keywords contained therein. Using these search keywords as an index, a look-up operation is performed for keyword relationships stored in the "keyword connection file 10" that are associated with a matching keyword in file 10.

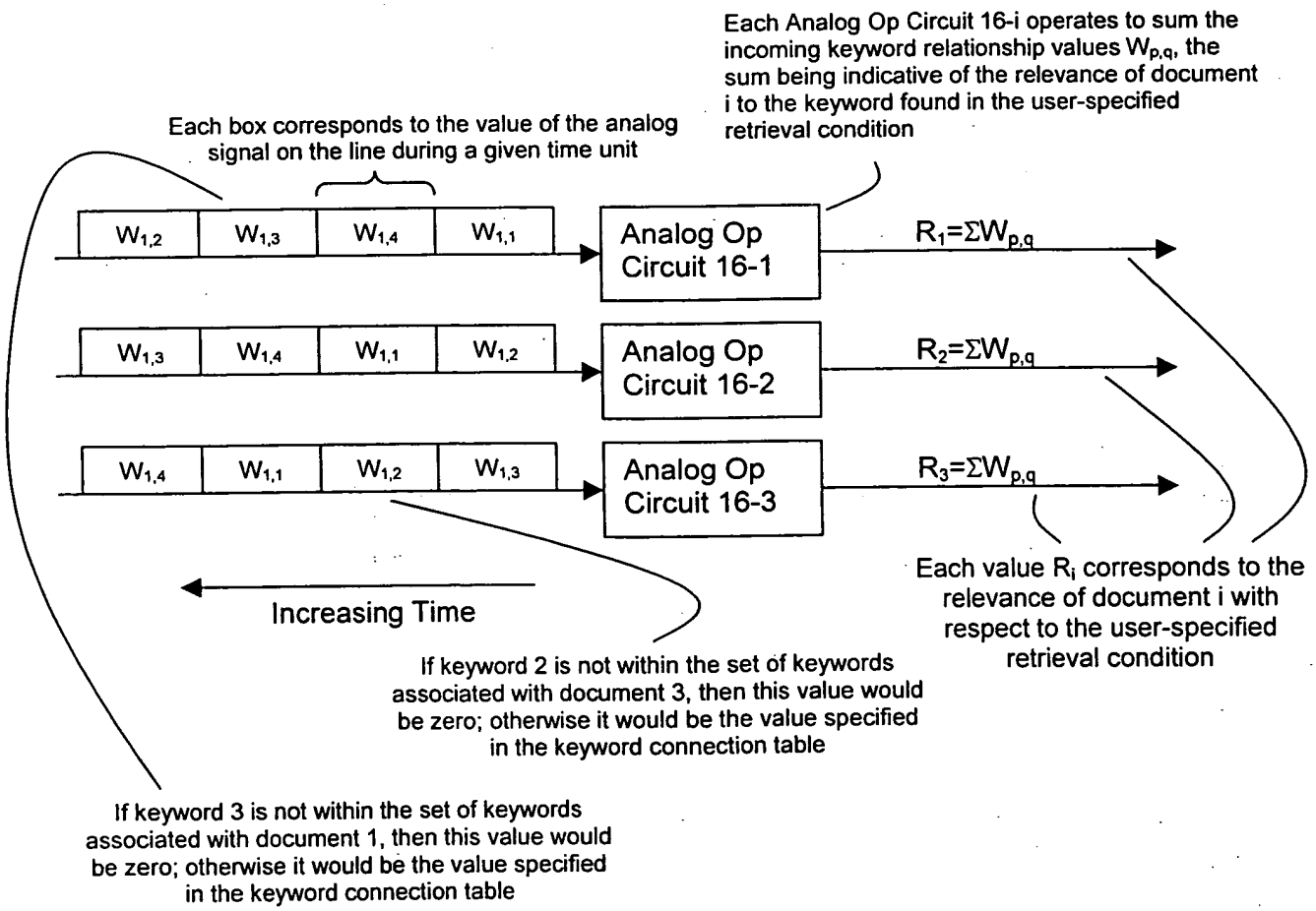
For a system wherein n keywords are available, each keyword has n total keyword relationships (e.g., for keyword 1, there would be keyword relationships $W_{1,1}$, $W_{1,2}$, $W_{1,3}$, ... $W_{1,n}$, with the value for $W_{1,1}$ being maximum). When a given keyword p is found in a search query, the n keyword relationships associated therewith are retrieved from the keyword connection file by the "keyword relationship selector" 4. This operation, which occurs in the digital domain, involves matching the input search keyword with a table index to identify keyword relationships that are associated with the input search keyword. However, such a matching operation does not remotely correspond with the analog key-to-continuous data stream matching operation of the present invention.

In further detail, as understood by Applicant, Morita discloses a document retrieval system comprising a "keyword connection file" 10, an "inverted file" 12, an "input part" 14, a "keyword relationship selector" 4, D/A elements 15-1 through 15-n, an "analog signal distributing circuit" 6, "analog operation circuits" 16-1 through 16-m, A/D elements 18-1 through 18-m, a "sorter" 8, and an "operation controller" 2. (See Morita, Figure 1).

In operation, a user of the Morita system who wishes to retrieve a document (from a database of m documents) but only knows generalities relating to the desired document's content (or who wishes to locate one or more documents that address a particular subject), enters a "retrieval condition" into the input part 14. (See Morita, col. 3, lines 4-6). This

"retrieval condition", which corresponds to a search query, specifies one or more keywords related to the document or topic of interest. (See Morita, col. 3, lines 6-8). For the purposes of simplicity, we will say that the retrieval condition designates only one keyword (KW_1). The keyword relationship selector 4 then accesses the keyword connection file 10 to retrieve each keyword relationship value $W_{1,k}$ that is associated with KW_1 (wherein k is 1 through n).

The digital-to-analog converters 15-1 through 15-n (wherein n is the number of keywords in the keyword connection file 10) convert the digital keyword relationship values supplied thereto into corresponding analog signal amplitudes. Thereafter, the analog signal distributing circuit 6 operates to distribute the keyword relationship values to the appropriate analog operation circuits 16-1 through 16-m (wherein m is the number of documents for which the system can assess relevance every n time units). The end-result of the distribution operation is that, for an example where n=4 and m=3, the signals arriving at the analog operation circuits will be as shown below:



The analog operation circuits 16-1 through 16-m are integration circuits that produce an inverted output, as shown in Figure 3. When these analog operation circuits receive the input as shown above, they operate to sum the input values. (See Morita, col. 4, lines 6-16). Each summed value R_i is then converted from an analog value to a digital value by the analog-to-digital converters (ADCs) 18-1 through 18-m. Thereafter, each relevance R_i can be sorted by sorter 8 to find the document i that is most applicable to the search query. During these operations, the operation controller 2 controls the timing sequences between the various system components.

Therefore, the Morita system operates to identify documents for retrieval from a database on the basis of which documents have predetermined keywords associated therewith that most closely correspond with user-specified keywords. The analog operations carried out on the keywords are not matching operations as claimed by Applicant but rather summing operations that are used to calculate a relevance. Therefore, Applicant respectfully submits that the Morita reference fails to teach or suggest matching an *analog* key to a continuous stream of *analog* data.

(ii) Morita further fails to disclose teach or suggest the use of a matching operation (either approximate matching or pattern matching) between a key and a continuous stream of data.

It should also be pointed out that the Morita patent fails to disclose, teach, or suggest an approximate matching operation or a pattern matching/comparison operation that occurs between a key and a continuous stream of data. The Morita patent addresses (1) the retrieval of keyword relationship values from a keyword connection file, wherein the retrieved keyword relationship values are those that are associated with a search keyword, and (2) the use of those retrieved keyword relationship values to calculate and rank the relevances of a plurality of documents to the search key. In this process, the only matching operations that are performed are (1) matching the search keyword to a keyword stored in the keyword connection file to thereby identify the appropriate keyword relationship values for retrieval, and (2) matching a keyword that is part of a keyword relationship file with a set of keywords (D_i) that is associated with a given document i. There is simply no contemplation of how an approximate match operation or a pattern match operation can be achieved between a key and a continuous stream of data. For example, the Morita patent fails to teach that the content of the stored documents can be searched for a match or approximate match to a search key. However, unlike the

Morita system, the present invention can be implemented as a fast, powerful, and efficient search tool that is capable of performing such a task. Accordingly, Applicant respectfully submits that the Morita patent fails to disclose, teach, or suggest a system capable of performing a match operation between a key and a continuous stream of data.

II. Claims 1-8, 21, and 31-32 are not anticipated by the Dixon reference because the Dixon reference fails to disclose approximate matching, and further fails to disclose pattern matching/comparison between a key and a continuous stream of data.

The Office Action rejected claims 1-8, 21, and 31-32 under 35 USC 102(b) for anticipation based on the Dixon patent. Of these claims, claims 1, 21, and 31 are independent.

As is well-known, in order to anticipate a claim, a cited reference must disclose each and every element of that claim. Applicant respectfully asserts that this standard has not been met with respect to claims 1-8, 21, and 31-32. As described above, the Dixon patent fails to disclose the use of approximate matching. Therefore, Applicant submits that claim 1, which recites an "approximate matching and pre-fetch processor" is not anticipated by the Dixon references.

Similarly, for the reasons noted above in Section I(a)(ii), claims 21 and 31, which recite "pattern matching a key to a continuous stream of data" and a "pattern comparison between a key and a signal representative of a continuous read of data" respectively, are not anticipated by the Dixon patent.

Accordingly, Applicant respectfully requests that the anticipation rejection be withdrawn.

III. The obviousness rejections based on the Dixon/Morita combination and the Dixon/Morita/Row combination lack merit.

The Office Action rejected claims 9-20, 24-30, 33-36, and 40-42 under 35 USC 103(a) for obviousness based on the combination of Dixon and Morita. Further, the Office Action rejected claims 22-23 and 37-39 under 35 USC 103(a) for obviousness based on the combination of Dixon, Morita, and Row (U.S. Patent No. 5,163,131). For the reasons set forth below, Applicant respectfully submits that the obviousness rejections are improper and should be withdrawn.

(a) Claims 9-11, 16, 17, 28, 33, and 41 are not obvious in view of the Dixon/Morita combination because neither of those references, when considered alone or in combination, disclose, teach, or suggest performing a matching operation via a comparison between an analog key and an analog data signal.

Claim 9 recites a limitation wherein a matching circuit identifies matches by *comparing an analog key with a analog signal representative of a continuous stream of data*. This limitation is not taught or suggested by the Dixon/Morita combination.

As noted above, Dixon performs exact match operations. These exact match operations are performed wholly in the digital domain. There is no discussion in Dixon of performing such operations in the analog domain. Accordingly, Dixon fails to teach or suggest performing match operations by comparing an analog key with an analog data signal representative of a continuous stream of data.

The Office Action cites the Morita reference for teaching this claim limitation. (See Office Action, page 6). However, as noted above, the Morita reference fails to disclose, teach, or suggest a key versus data comparison operation that is performed in the analog domain. Instead, the Morita reference uses an analog integrator to perform summing operations on analog signals representative of keyword relationship values, wherein the resultant sum is indicative of the relevance of a stored document to a retrieval condition.

No comparisons are made by Morita between a key and data that is read from a mass storage medium. If the keywords and keyword relationship values stored in databases 10 and 12 are considered to be data read from a mass storage medium, then the only matching operations performed on this data are performed in the digital domain (when the keywords derived from the user-specified retrieval condition are used as an index into the files 10 and 12 to retrieve pertinent keyword relationship values and pertinent document-to-keyword relations).

As noted above, once retrieved, the digital keyword relationship values are converted to analog signals and summed to identify the relevance of a document. *Thus, within the analog domain, no comparisons are made between a key and data*. Instead, a summing operation between keyword values is performed in the analog domain. Therefore, it is Applicant's position that the Morita reference fails to teach or suggest the limitation in claim 9 reciting a matching circuit that compares an analog key with an analog data signal representative of a continuous stream of data read from a mass storage medium.

Further, when the Morita reference is viewed in combination with the Dixon reference, there is no teaching to use a matching circuit that performs analog key-to-analog data comparisons. Dixon performs all comparisons between the key and data in the digital domain (using exact matching techniques). Morita performs, within the digital domain, (1) a look-up in a keyword connection file for keyword relationship values associated with a keyword that is present in a user-specified retrieval condition, and (2) a look-up in an inverted file for keywords that are related to a given document. The only operations performed in the analog domain are summing operations on the keyword relationship values pertinent to a particular document. There is no teaching within the Morita reference that key-to-data comparisons can or should be performed within the analog domain. Morita merely notes that by summing analog signals rather than digital signals, "it is possible to considerably increase the speed of operation". (See Morita, col. 2, lines 5-8). This statement can only be extended to the present invention's use of analog key to analog data comparisons by the use of impermissible hindsight because it is only by virtue of the application of the present invention that the concept of performing a comparison in the analog domain between an analog key and analog data is taught. If Morita truly taught that analog key-to-analog data comparisons, Morita would note that retrieval of the keyword relationship values can be performed in the analog domain; however, this is not the case. Morita simply fails to teach or suggest replacing the operation of digitally matching a digital key with a digital data stream with an operation of matching an analog key with an analog data stream.

Therefore, Applicant respectfully requests that the obviousness rejection of claim 9 be withdrawn. Further, because claims 10-11 and 33 depend from claim 9, Applicant also requests that the obviousness rejections thereto be withdrawn. Further still, claim 16, which depends from claim 12, recites that the "matching circuit is configured to match an analog signal key with an analog data signal." Further still, claims 28 and 41, which respectively recite limitations relating to an analog key and approximate matching in the analog domain, are not rendered obvious by the Dixon/Morita combination. Therefore, for the same reasons expressed in connection with claim 9, Applicant respectfully submits that these obviousness rejections based on Dixon and Morita lack merit and should be withdrawn.

(b) Independent claims 12, 18, and 24 are not rendered obvious by the Dixon/Morita combination because the Dixon/Morita combination fails to disclose, teach, or suggest performing a pattern matching or pattern comparison operation between a key and a continuous stream of data.

Independent claims 12, 18, and 24 each include limitations relating to a pattern matching or pattern comparison operation performed between a key and a continuous stream of data. The Dixon/Morita combination fails to disclose, teach, or suggest this limitation.

As noted above in section I(a)(ii), rather than pattern match a search key to a continuous stream of data, the Dixon patent teaches that the search key is to be compared to individualized chunks of data as determined by a "compare-and-skip operation". Thus, the Dixon patent fails to disclose, teach, or suggest the aforementioned claim limitation.

Further, the only matching operation performed by the Morita system between a key and data occurs when the Morita system retrieves keyword relationship values from the keyword connection file and document-related keywords from the inverted file. These operations are standard look-up operations wherein a keyword found in a user-specified retrieval condition is used as an index into the files. For the reasons set forth in Section I(b), Applicant respectfully submits that these conventional look-up operations are not readable as pattern matching a key to a continuous stream of data. Therefore, the Morita patent also fails to disclose, teach, or suggest matching a key to a continuous stream of data.

Because both of the cited references are silent as to the claim limitations relating to pattern matching a key to a continuous stream of data, and because the Dixon patent teaches a "compare-and-skip" operation of the "start and stop" type described as inefficient in the background section of the application (see Application, page 2, lines 12-33), Applicant respectfully submits that the obviousness rejections of independent claims 12, 18, and 24 (and all claims depending therefrom) lack merit and should be withdrawn.

(c) Independent claims 20 and 42 are not rendered obvious by the Dixon/Morita combination because the Dixon/Morita combination fails to disclose, teach, or suggest performing an approximate matching operation.

Claims 20, and 42 include limitations relating to approximate matching. Specifically, claims 20 and 42 recite "an approximate matching and pre-fetch processor". As previously noted, the Dixon patent teaches the use of an exact matching circuit rather than an approximate matching circuit. With Dixon, a "hit" is always indicative of the presence of the

search key within the searched data with a certainty of 100%. Further, the only matching performed by the Morita system between a "key" and data is an exact match operation performed when retrieving keyword relationship values and document-related keywords from file memories. There is no teaching or contemplation that such exact match operations should be replaced with approximate matching operations, nor is there a discussion or contemplation of how approximate matching could be achieved. The only "fuzzy" operation performed by the Morita system is the summation of keyword relationship values to determine a documents' relevance to a search query. However, in determining this relevance, "approximate matching" (see Application, page 7, line 32 – page 8, line 27) is not used.

Therefore, because the Dixon and Morita references fail to disclose, teach, or suggest the performance of an approximate matching operation to a person of ordinary skill in the art, Applicant respectfully submits that the obviousness rejections of independent claims 20 and 42 (and all claims depending therefrom) lack merit and should be withdrawn.

(d) Independent claims 22 and 23 are not rendered obvious by the Dixon/Morita combination further in view of U.S. Patent No. 5,163,131 (issued to Row et al.) because the Dixon/Morita/Row combination fails to disclose teach or suggest the claim limitations relating to pattern matching/comparison and approximate matching.

The Office Action cites the Row patent for disclosing the limitations in claims 22 and 23 relating to "a network addressable input/output port for receiving data inquiries and responding thereto". The Row patent discloses a parallel I/O network file server architecture that can process remote file requests received via a network connection. However, the Row patent is utterly silent in connection with matching operations that can be performed between a key and data. Therefore, the Row patent fails to provide any teachings or suggestions to those of ordinary skill in the art that relate to either pattern matching or approximate matching a key to data.

Accordingly, because the Dixon/Morita combination fails to supply any teachings relating to pattern matching or approximate matching a key to data (as noted above), and because the Row patent fails to bridge this gap, Applicant respectfully submits that the obviousness rejections of claims 22 and 23 lack merit for the same reasons set forth in Sections II(b) and II(c). Therefore, Application respectfully requests that the obviousness rejection of claims 22 and 23 be withdrawn. Moreover, for these same reasons, Applicant respectfully

requests that the obviousness rejections of dependent claims 37-39 be withdrawn (claims 37-39 depend from claim 1, which includes a limitation relating to approximate matching).

(e) Independent claim 34 is not rendered obvious by the Dixon/Morita combination because the Dixon/Morita combination fails to disclose, teach, or suggest the claim limitation relating to frameless matching.

Claim 34 has been amended to recite that the matching circuit is a matching circuit that "*framelessly*" compares a determined key representative of the data sought to be retrieved with a data signal representative of a continuous stream of data read from said mass storage medium. As noted above, in connection with Section I(a)(iii),the Dixon patent fails to disclose, teach, or suggest such a limitation. Further, the Morita patent fails to bridge this gap. With Morita the only matching operation is performed during simple look-ups in the keyword connection file and the inverted file. There is no teaching present therein that would lead one of ordinary skill in the art to believe that this matching operation is performed framelessly. That is, it is believed that the Morita system organizes the match operation around the format in which the keywords are stored in the two files. Therefore, Applicant respectfully submits that the "frameless" claim limitation of claim 34 is not taught by the Dixon/Morita combination.

Conclusion:

For the foregoing reasons, Applicant submits that the pending claims are allowable over the cited references. The cited references, when considered alone, or in combination fail to disclose, teach, or suggest the following claim limitations found in the independent claims of the present application: (1) *approximate matching*, (2) *pattern matching/comparison* between a key and a continuous data stream, (3) matching an *analog key* to an *analog data signal*, and (4) *frameless* matching between a key and a data stream. Instead, the Dixon reference discloses exact matching between a key and individualized chunks of data via a "compare-and-skip" matching operation, and the Morita reference discloses a conventional look-up operation to retrieve, from memory files, keyword relationship values and document-related keywords that are directly linked with a search keyword, wherein the retrieved keyword relationship values and document-related keywords are used to compute a sum that is indicative of the relevance of a stored document to the search keyword. Further, the cited Row reference does not relate to

any of the afore-mentioned claim limitations. Therefore, Applicant respectfully submits that the claims are allowable over the cited references and favorable action is respectfully requested.

Respectfully submitted,

Benjamin L. Volk, Jr., Reg. No. 48,017
Thompson Coburn LLP
One US Bank Plaza
St. Louis, MO 63101
314-552-6352
314-552-7352 (fax)

Marked-Up Copy of Amended Claims 9 and 34 (additions underlined; deletions bracketed)

9. (amended) A retrieval device for retrieving data from a mass storage medium including a matching circuit for comparing a determined key representative of the data sought to be retrieved with a data signal representative of a continuous stream of data read from said mass storage medium, said determined key being an analog signal [representative of the data itself] and the data signal also being an analog signal.

34. (amended) A retrieval device for retrieving data from a mass storage medium including a matching circuit for framelessly comparing a determined key representative of the data sought to be retrieved with a data signal representative of a continuous stream of data read from said mass storage medium, said determined key being a digital representation of the data itself and the data signal also being digital.

Clean Copy of Amended Claims 9 and 34 and New Claims 43-81

9. (amended) A retrieval device for retrieving data from a mass storage medium including a matching circuit for comparing a determined key representative of the data sought to be retrieved with a data signal representative of a continuous stream of data read from said mass storage medium, said determined key being an analog signal and the data signal also being an analog signal.

34. (amended) A retrieval device for retrieving data from a mass storage medium including a matching circuit for framelessly comparing a determined key representative of the data sought to be retrieved with a data signal representative of a continuous stream of data read from said mass storage medium, said determined key being a digital representation of the data itself and the data signal also being digital.

43. (new) A retrieval device for retrieving data from a database, the retrieval device comprising:

a programmable logic device in communication with a database, the programmable logic device being configured to determine whether a pattern match exists between a key that is representative of data desired to be retrieved from the database and a data signal that is representative of a continuous stream of data read from the database.

44. (new) The retrieval device of claim 43 further comprising a processor in communication with the programmable logic device, wherein the processor is configured to communicate the key to the programmable logic device.

45. (new) The retrieval device of claim 44 wherein the retrieval device interfaces the database with a system bus, and wherein the processor is further configured to (1) receive a search request from the system bus and (2) determine the key at least partially according the received search request.

46. (new) The retrieval device of claim 45 wherein the received search request was placed on the system bus by a central processing unit (CPU).

47. (new) The retrieval device of claim 45 wherein the received search request was placed on the system bus by a remote computer system via a communications network and a network interface that connect the remote computer system with the system bus.

48. (new) The retrieval device of claim 45 wherein the processor comprises one or more microprocessors operating under software control.

49. (new) The retrieval device of claim 45 wherein the processor comprises a programmable logic device.

50. (new) A retrieval device for retrieving data from a database, the retrieval device comprising:

a programmable logic device in communication with a database, the programmable logic device being configured to determine whether an approximate match exists between a key that is representative of data desired to be retrieved from the database and a data signal that is representative of a continuous stream of data read from the database.

51. (new) The retrieval device of claim 50 further comprising a processor in communication with the programmable logic device, wherein the processor is configured to communicate the key to the programmable logic device.

52. (new) The retrieval device of claim 51 wherein the retrieval device interfaces the database with a system bus, and wherein the processor is further configured to (1) receive a search request from the system bus and (2) determine the key at least partially according the received search request.

53. (new) A data retrieval system comprising:

a mass storage medium in which data is stored; and

a retrieval device in communication with the mass storage medium, wherein the retrieval device is configured to (1) receive a continuous stream of data from the mass storage

medium, and (2) process the data stream to determine whether an approximate match exists therein with respect to a key that is representative of data sought to be retrieved.

54. (new) The system of claim 53 further comprising a system bus in communication with the retrieval device, wherein the system bus is configured to provide a search request to the retrieval device, and wherein the retrieval device is further configured to process the search request to determine the key.

55. (new) The system of claim 54 further comprising a processor in communication with the system bus, wherein the processor is configured to place a search request on the system bus for receipt by the retrieval device.

56. (new) The system of claim 54 further comprising a remote computer system in communication with the system bus via a communications network and network interface, wherein the remote computer system is configured to communicate a search request to the system bus for placement thereon and receipt by the retrieval device.

57. (new) The system of claim 56 further comprising a processor in communication with the system bus, wherein the processor is configured to place a search request on the system bus for receipt by the retrieval device.

58. (new) The system of claim 53 wherein the retrieval device is further configured to process the data stream to determine whether an approximate match exists via a pattern comparison between the key and the data stream.

59. (new) The system of claim 58 wherein the retrieval device is further configured to perform the pattern comparison via frameless matching.

60. (new) The system of claim 58 wherein the key is an analog key and wherein the data stream is an analog data stream.

61. (new) The system of claim 60 wherein the retrieval device is further configured to perform the pattern comparison by calculating a correlation coefficient that is indicative of a degree of correlation between the key and the data stream.

62. (new) The system of claim 61 wherein the retrieval device is further configured to determine that an approximate match exists if the correlation coefficient has a value larger than or at least equal to a predetermined threshold value.

63. (new) The system of claim 62 wherein the threshold value is user-specified.

64. (new) The system of claim 58 wherein the key is a digital key and wherein the data stream is a digital data stream.

65. (new) The system of claim 53 wherein the key in an analog key and wherein the data stream is an analog data stream.

66. (new) The system of claim 65 wherein the retrieval device is further configured to determine whether an approximate match exists between the determined key and the data stream by calculating a correlation coefficient that is indicative of a degree of correlation between the key and the data stream.

67. (new) The system of claim 53 wherein the key is a digital key and wherein the data stream is a digital data stream.

68. (new) The system of claim 53 wherein the retrieval device is further configured to determine whether an approximate match exists between the key and the data stream via frameless matching.

69. (new) The system of claim 53 wherein the search request is representative of a user-specified query.

70. (new) The system of claim 53 wherein the retrieval device is further configured to determine a starting location in the mass storage medium that represents the location at which the data stream is to begin.

71. (new) The system of claim 70 wherein the retrieval device is further configured to determine a ending location in the mass storage medium that represents the location at which the data stream is to terminate.

72. (new) The system of claim 53 wherein the retrieval device comprises programmable logic for determining whether an approximate match exists between the key and the data stream.

73. (new) The system of claim 53 wherein the retrieval device comprises programmable logic for determining whether an approximate match exists via a pattern comparison between the key and the data stream.

74. (new) The system of claim 53 wherein the mass storage medium comprises a database of DNA sequences.

75. (new) The system of claim 53 wherein the mass storage medium comprises a database of audio recordings.

76. (new) The system of claim 53 wherein the mass storage medium comprises an image database.

77. (new) A data retrieval system comprising:

a mass storage medium in which data is stored; and

a retrieval device in communication with the mass storage medium, wherein the retrieval device is configured to (1) receive a continuous stream of data from the mass storage medium, and (2) process the data stream to determine whether a pattern match exists therein with respect to a key that is representative of data sought to be retrieved.

78. (new) The system of claim 77 further comprising a system bus in communication with the retrieval device, wherein the system bus is configured to provide a search request to the retrieval device, and wherein the retrieval device is further configured to process the search request to determine the key.

79. (new) The system of claim 77 wherein the key is an analog key and wherein the data stream is an analog data stream.

80. (new) The system of claim 77 wherein the key is a digital key and wherein the data stream is a digital data stream.

81. (new) The system of claim 77 wherein the retrieval device comprises a programmable logic device configured to process the data stream to determine whether a pattern match exists therein with respect to a key that is representative of data sought to be retrieved.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence and the documents referred to as enclosed herein are being transmitted by facsimile to the U.S. Patent and Trademark Office at Facsimile No. (703) 746-7238 on October 31, 2003.

R. Haferkamp
Reg. No. 29,072

In re application of: Indeck et al.	:	
Serial No.: 09/545,472	:	Examiner: Fleurantin, Jean B.
Filed: April 7, 2000	:	Group Art Unit: 2172
For: Associative Database Scanning And Information Retrieval	:	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE B

Sir:

This amendment is being submitted by facsimile in response to the latest action, a final rejection entered June 17, 2003, the time to respond to which having been extended to November 17, 2003, by the enclosed petition for two months' extension of time. Furthermore, Applicants are submitting herewith a Request for Continued Examination and the appropriate fee is being charged against Applicants' representative's deposit account in order to gain additional examination of the amendment submitted herewith. By this response, Applicants are canceling claims 1-23 and claims 31-81. New claims 82-101 are being presented for examination at this time.

In accordance with present practice, the appropriate replacement pages are enclosed herewith.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 11 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (canceled)

2. (canceled)

3. (canceled)

4. (canceled)

5. (canceled)

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (canceled)

11. (canceled)

12. (canceled)

13. (canceled)

14. (canceled)

15. (canceled)

16. (canceled)

17. (canceled)

18. (canceled)

19. (canceled)

20. (canceled)

21. (canceled)

22. (canceled)

23. (canceled)

24. (currently amended) A method for retrieving data from a mass storage medium, said method comprising the steps of:

receiving a search command from a processor for said mass storage medium,

determining ~~a~~ at least one key as representative of the data desired to be retrieved from said mass storage medium,

making ~~a~~ an automatic pattern comparison between multiple bits simultaneously of at least one of said keys with a data signal representative of a continuous stream of data read from said mass storage medium, said at least one key not being representative of any particular data structure and not necessarily the same structure in which said data is stored in said mass storage device, and

determining which data matches said at least one key.

25. (currently amended) The method of claim 24 wherein the step of determining which data matches the at least one key consists of determining an approximate match between said data and said at least one key.

26. (currently amended) The method of claim 24 further comprising the step of continuously correlating the at least one key with the data signal in order to determine a match.

27. (currently amended) The method of claim 24 wherein the step of determining the at least one key further comprises the steps of writing and reading data corresponding to said at least one key on a storage medium.

28. (currently amended) The method of claim 24 wherein at least one of said keys is an analog signal.

29. (currently amended) The method of claim 24 wherein at least one of said keys is a digital signal.

30. (currently amended) The method of claim 24 wherein the step of determining the at least one key further includes the step of digitizing the signal corresponding to the at least one key.

31. (canceled)

32. (canceled)

33. (canceled)

34. (canceled)

35. (canceled)

36. (canceled)

37. (canceled)

38. (canceled)

39. (canceled)

40. (canceled)

41. (canceled)

42. (canceled)

43. (canceled)

44. (canceled)

45. (canceled)

46. (canceled)

47. (canceled)

48. (canceled)

49. (canceled)

50. (canceled)

51. (canceled)

52. (canceled)

53. (canceled)

54. (canceled)

55. (canceled)

56. (canceled)

57. (canceled)

58. (canceled)

59. (canceled)

60. (canceled)

61. (canceled)

62. (canceled)

63. (canceled)

64. (canceled)

65. (canceled)

66. (canceled)

67. (canceled)

68. (canceled)

69. (canceled)

70. (canceled)

71. (canceled)

72. (canceled)

73. (canceled)

74. (canceled)

75. (canceled)

76. (canceled)

77. (canceled)

78. (canceled)

79. (canceled)

80. (canceled)

81. (canceled)

82. (new) A method for searching for an approximate match between at least one key and a target data, the method comprising:

in response to a search inquiry, simultaneously comparing multiple bits of said at least one key and said target data,

determining which portions of said target data match said at least one key in accordance with a pre-determined search criteria, and

continuously advancing one or the other of the at least one key with respect to the target data until substantially the entirety of said target data has been compared with said at least one key.

83. (new) The method of claim 82 wherein continuously advancing one or the other of said at least one key with respect to the target data includes doing so by less than the length of said at least one key.

84. (new) The method of claim 83 further comprising changing one or the other or both of the at least one key and the search criteria by re-configuring a programmable logic device.

85. (new) The method of claim 84 wherein changing includes solely re-configuring the at least one key.

86. (new) The method of claim 84 wherein changing includes solely re-configuring the search criteria.

87. (new) The method of claim 84 further comprising storing the portions of said target data determined to match said at least one key.

88. (new) The method of claim 84 wherein determining which portion of the target data matches the at least one key consists of determining an approximate match between said target data and said at least one key.

89. (new) The method of claim 84 wherein determining includes continuously correlating the at least one key with the target data in order to determine a match.

90. (new) The method of claim 84 further comprising determining the at least one key by writing and reading data corresponding to said at least one key on a storage medium.

91. (new) The method of claim 84 wherein at least one of said keys is an analog signal.

92. (new) The method of claim 84 wherein at least one of said keys is a digital signal.

93. (new) The method of claim 84 wherein determining the at least one key further includes digitizing a signal corresponding to the at least one key.

94. (new) A method for searching for an approximate match between at least one key and a target data, said target data comprising an analog waveform, the method comprising:

in response to a search inquiry, correlating said at least one key with a portion of said target data,

determining which portions of said target data match said at least one key in accordance with a pre-determined correlation threshold, and

continuously advancing one or the other of said at least one key and target data until substantially the entirety of said target data has been compared with said key.

95. (new) The method of claim 94 wherein continuously advancing one or the other of said at least one key with respect to the target data includes doing so by less than the length of said at least one key.

96. (new) The method of claim 95 further comprising changing one or the other or both of the at least one key and the search criteria by re-configuring a programmable logic device.

97. (new) The method of claim 94 further comprising storing the portions of said target data determined to match said at least one key.

98. (new) The method of claim 94 wherein determining which portion of the target data matches the at least one key consists of determining an approximate match between said target data and said at least one key.

99. (new) The method of claim 94 wherein determining includes continuously correlating the at least one key with the target data in order to determine a match.

100. (new) The method of claim 94 further comprising determining the at least one key by writing and reading data corresponding to said at least one key on a storage medium.

101. (new) The method of claim 94 wherein determining the at least one key further includes digitizing a signal corresponding to the at least one key.

Remarks:

The Examiner is thanked for the courtesies shown to Applicants' undersigned representative and two of the co-inventors of the subject application, Professors Indeck and Franklin, during their personal visit on Tuesday, October 21, 2003. During that interview, several issues were discussed including the invention, the prior art, and the Examiner's recommendation for further prosecution. This submittal is intended to follow through with the Examiner's recommendations for further prosecution.

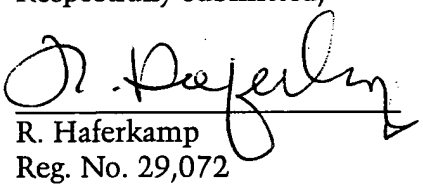
More particularly, the Examiners present at the interview requested that method claims be examined in this application and that the apparatus claims be canceled and resubmitted in a continuation application. Accordingly, the apparatus claims in this application have been canceled by this amendment and the previous method claims, claims 24-30, have been amended with additional method claims 82-93 being presented to provide more comprehensive coverage of the method invention. This amendment also adds claims 94-101 which correspond to a search in target data comprising an analog waveform. While the previous Office Action suggested that the Morita patent somehow discloses an analog signal, those comments are respectfully traversed. Instead, Morita teaches that documents stored in a database should be represented during the search process by key words. These key words are associated with each other and with documents stored in the database. A relationship is determined having a numerical value indicative of the relationship between two key words. For a given search query that includes one or more key words, the Morita system will produce a series of key word relationship values applicable to any given document in storage. These key word relationship values are then converted to analog values and summed to determine the relevance of a particular document to the search query. As such, the key words are not used as a point of comparison for finding matches. Instead, Morita teaches that analog sums of key word relationship values may be digitized and stored in the digital domain to assess the relevance of a particular document to a search query. Applicants' newly submitted method claim 94 patentably distinguishes from Morita by requiring that the target data comprises an analog waveform. There can be no question but that Morita fails to disclose an analog waveform and instead merely discloses discreet values which are not constructed into a waveform nor do they comprise a waveform. Accordingly, claim 94 and the claims depending from it, are also fully allowable over the prior art of record.

In considering the patentability of the method claims, the Examiner suggested that certain clarifying amendments be made in order to more clearly define the invention over the prior art. In particular, the suggestion was made, and is adopted in this amendment, that claim 24 be amended to recite that an automatic pattern comparison is made between multiple bits of at least one key simultaneously with the target data. This method is neither disclosed nor suggested in the Dixon patent previously cited and forming the basis of the previous rejections. Dixon discloses a methodology where a key and target data is compared bit by bit in order to determine a match between the key and the target data. There is neither disclosure nor suggestion of the capability or desirability of processing the target data in any other way. Still other distinctions exist between the present invention in its method aspects and Dixon, however it is respectfully submitted that this distinction renders the claims fully patentable over the Dixon prior art reference. Similar limitations are found in the independent claims added by this amendment.

Applicants are submitting this amendment in an effort to obtain an early allowance of claims which are markedly different from the prior art. Applicants fully intend to file additional applications in order to pursue further, more comprehensive and broader protection for the subject invention, including protection for the invention in terms of an apparatus.

The Examiner is respectfully requested to pick up this amendment at his earliest convenience and, entering same, pass the case to allowance. Certainly, the Examiner is encouraged to telephone Applicants' undersigned representative in order to clear up any last minute details should same be necessary prior to allowance.

Respectfully submitted,



R. Haferkamp
Reg. No. 29,072
Thompson Coburn LLP
One US Bank Plaza
St. Louis, Missouri 63101
(314) 552-6000
(314) 552-7000 (fax)